

IN THE CLAIMS:

Please amend claims 1, 6, 7, 10, 12, 14, 20 and 27 as follows:

1 1. (Currently Amended) A rotary tool for drilling into a
2 soil formation from its surface, controllably injecting water and
3 dry binder at known depths below the surface of said formation,
4 and mixing said soil, water and dry binder to form an in-situ
5 piling, said tool comprising:

6 a rotary shaft having a central axis of rotation
7 adapted to be driven bi-directionally around said axis, and bi-
8 directionally along said axis;

9 a vane on and extending radially from said shaft to be
10 rotated around and moved axially by said shaft, said vane being
11 so disposed and arranged as to move through the formation along a
12 helical path to drill into said formation, to stir the material
13 of the formation, and ultimately to mix the material of the
14 formation with water and dry binder;

15 a water injector and a binder injector carried by said
16 tool, each injector having a respective axis of emission of water
17 or of dry binder, said axes of emission being directed away from
18 said tool into said formation at a respective location along said
19 central axis;

20 said injectors being so disposed and arranged relative
21 to one another that the material of their emissions will during a
22 limited number of revolutions of said shaft, encounter one

23 another, [then] there to be mixed as a pre-determined ratio of
24 water and of dry binder, said water including water emitted from
25 the water injector and water which may have already been present
26 at that location.

1 2. (Original) A rotary tool according to claim 1 in which
2 said injectors are set in said shaft with their axes of emission
3 substantially normal to said central axis, and located along said
4 central axis such that the emission of one of them will, within a
5 limited number or rotations of the shaft encounter and mix with
6 the other in a temporally suitable time related to the curing of
7 the binder and drainage of the water.

1 3. (Original) A rotary tool according to claim 2 in which
2 said injectors are disposed about 180 degrees apart as viewed in
3 lateral section.

1 4. (Original) A rotary tool according to claim 1 in which
2 the said water injector and binder injector are provided as a
3 pair, their axes of emission intersecting adjacent to said shaft
4 under in-situ pressure whereby to produce a mixture of water and
5 of binder with a velocity having a radial component of motion.

1 5. (Original) A rotary tool according to claim 1 in which
2 said binder injector is surrounded by a plurality of water
3 injectors, the axes of emission of said water injectors
4 intersecting the axis of emission of the binder injector

1 6. (Currently Amended) A rotary tool according to claim 1 in
2 which said injectors are set in said vane at a [radial] distance
3 from said shaft.

1 7. (Currently Amended) A rotary tool according to claim 6
2 in which the said water injector and binder injector are provided
3 as a pair, their axes of emission intersecting adjacent to said
4 shaft under in-situ pressure whereby to produce a mixture of
5 water and of binder with a velocity having a radial component of
6 motion.

1 8. (Original) A rotary tool according to claim 2 in which a
2 pair of said water injectors and at least one of said binder
3 injectors are set in said shaft, with said binder injector
4 located axially between said water injectors.

1 9. (Original) A rotary tool according to claim 2 in which a
2 pair of said binder injectors and at least one of said water
3 injectors are set in said shaft, with said water injectors

4 located axially between said binder injectors.

1 10. (Currently Amended) In combination:

2 a rotary tool according to claim 1; and

3 a control valve respective to each of said injectors,

4 whereby the rate of supply of water and of dry binder can

5 independently be regulated by said control [valve] valves to

6 provide binder at a rate desired at a respective depth and water

7 at a rate desired which with existing water already in the

8 formation at that depth, will constitute at least sufficient

9 water for stoichiometric reaction of the binder.

1 11. (Original) A combination according to claim 10 in which
2 a program controls said control valves to establish the rates of
3 supply of the binder and the water.

1 12. (Currently Amended) A combination according to claim 11
2 in which said rates are related to already known water conditions
3 and dry binder requirements at respective depths below said
4 surface.

1 13. (Original) A combination according to claim 11 in which
2 said rates are related to water conditions sensed at depths below
3 said surface.

1 14. (Currently Amended) A combination according to claim 10
2 in which said injectors are set in said shaft with their axes of
3 emission substantially normal to said central axis, and located
4 along said central axis such that the emission of one of them
5 will, within a limited number [[or]] of rotations of the rotary
6 tool encounter and mix with the other in a temporally suitable
7 time related to the curing of the binder and drainage of the
8 water.

1 15. (Original) A combination according to claim 10 in which
2 the said water injector and binder injector are provided as a
3 pair, their axes of emission intersecting adjacent to said shaft
4 under in-situ pressure whereby to produce a mixture of water and
5 of binder with a velocity having a radial component of motion.

1 16. (Original) A combination according to claim 10 in which
2 said binder injector is surrounded by a plurality of water
3 injectors, the axes of emission of said water injectors
4 intersecting the axis of emission of the binder injector.

1 17. (Original) A combination according to claim 10 in which
2 said injectors are set in said vane at a radial distance from
3 said shaft.

1 18. (Original) A combination according to claim 10 in which
2 a pair of said binder injectors and at least one of said water
3 injectors are set in said shaft, with said water injectors
4 located axially between said binder injectors.

1 19. (Original) Apparatus according to claim 1 in which a
2 baffle is fixed to each said vane to confine emissions from said
3 injectors to the region encountered by said vanes.

1 20. (Currently Amended) The method of forming an in-situ
2 piling in a soil formation with a dry binder and sufficient water
3 to produce a stoichiometrically correct mixture, comprising:

4 with a rotary tool, drilling into said formation, said
5 tool having a rotary shaft that has a central axis of rotation
6 and a vane for drilling into and mixing the soil, rotated around
7 and moved axially by said shaft, said vane being so disposed and
8 arranged as to move through the formation along a helical path to
9 drill into said formation, to stir the material of the formation,
10 and ultimately to mix the material of the formation with water
11 and binder;

12 a water injector and a dry binder injector carried by
13 said tool;

14 driving said tool axially into and out of said

15 formation while rotating it;
16 at some times during axial movement of said tool,
17 discharging water or dry binder from a respective injector into
18 said soil formation along a respective axis of emission of water
19 or of said binder, said axes of emission being directed away from
20 said tool into said formation at a respective location along said
21 central axis, so that the material of their emissions will during
22 a limited number of revolutions of said shaft encounter one
23 another, there to be mixed as a pre-determined ratio of water and
24 of binder, said water including water emitted from the water
25 injector and water which may have already been present at that
26 depth.

1 21. (Original) The method of claim 20 in which injection of
2 binder is made during passage of said tool into said soil
3 formation.

1 22. (Original) The method of claim 20 in which injection of
2 binder is made during passage of said tool out of said soil
3 formation.

1 23. (Original) The method of claim 20 in which injection of
2 water is made during passage of said tool into said soil
3 formation.

1 24. (Original) The method of claim 20 in which injection of
2 water is made during passage of said tool out of said soil
3 formation.

1 25. (Original) The method of claim 20 in which the emissions
2 of said injectors intersect adjacent to said shaft.

1 26. (Original) The method of claim 20 in which the emission
2 of one of said injectors is encountered in said soil formation in
3 a temporally suitable time related to the curing of the binder
4 and drainage of the water.

1 27. (Currently Amended) The method of claim 20 in which the
2 emission of water [[id]] is determined by a program responsive to
3 data from a representative core.

1 28. (Original) The method of claim 20 in which the emission of
2 water is determined by a program responsive to data relating to
3 water content already in the soil derived from a sensor on said
4 tool disposed at an axial location below the place of injection
5 of said binder.

1 29. (Original) The method of claim 20 in which the pressure
2 of the stream of water and of the binder in the tool is above the
3 ambient pressure which exists in the formation.